

26th Annual Westmont College

Student Research Symposium



WESTMONT

April 20, 2022
3:30-5:00 p.m.

*Winter Hall
Westmont College*

2022 Spring Research Symposium

April 20, 2022
3:30-5:00 p.m.

*Winter Hall
Westmont College*



One of the hallmarks of Westmont College's academic program is the opportunity for undergraduate students to work directly with faculty on research and scholarly projects. Work presented at the Student Research Symposium includes student work conducted during the past year, from the divisions of the Humanities, Social Sciences, and the Natural and Behavioral Sciences. The purpose of this symposium is to celebrate the noteworthy accomplishments of Westmont students.

With special appreciation for support from the Office of the Provost

PARTICIPANTS

Blythe Armstrong '23
Biology
Poster #1

Chandler Baker '24
Physics
Poster #14

Maria Barend '22
Sociology
Poster #15

Nicole Bond '23
Chemistry
Poster #18

Emma Boyle '22
Psychology
Poster #6

Abigail Bradshaw '23
Communication Studies
Poster #12

Kendall Breedan '22
Kinesiology
Poster #17

Esther Cabrera '22
Kinesiology
Poster #17

Braden Chaffin '23
Chemistry
Poster #24

Madison Chong '22
Psychology
Poster #7

Rianne Chow '22
Sociology
Poster #25

Laura Dagg '22
Biology
Poster # 9 & 10

Bryan Dionisio '22
Chemistry
Poster #18

Andrea Fernandez Gaitan '23
Biology
Poster #5

Chris Glevy '22
Chemistry
Poster #24

Elise Hanna '22
Psychology
Poster #23

Noah Hareb '22
Biology
Poster #9

Madison Henry '22
Sociology
Poster #4

Chloe Howard '22
Psychology
Poster #2

Isabelle Hugoniot '23
Biology
Poster #9 & 10

Kaylie Jerdal '22
Sociology
Poster #21

Christian Kim '22
Chemistry
Poster #18

Michael Kong '22
Psychology
Poster #22

Tiana Krukar '22
Psychology
Poster #13

Asher Littlejohn '23
Chemistry
Poster #18

Monika Lopez '22
Kinesiology
Poster #17

Teagan Matye '22
Kinesiology
Poster #17

Levi Nelson '22
Computer Science
Poster #11

Allison Nobles '22
Psychology
Poster #3

Emily Peterson '22
Psychology
Poster #19

Jenna Peterson '22
Psychology
Poster #16

Eric Reyes '24
Biology
Poster # 9 & 10

Michael Rodrigues '22
Kinesiology
Poster #17

Sam Rosenhagen '23
Chemistry
Poster #18

Melanie Salvador '23
Biology
Poster #1

Carlos Sandoval '22
Kinesiology
Poster #17

Loren Schneider '22
Communication Studies
Poster #20

Anna Terveen '22
Biology
Poster #5

Cassidy Tran '23
Chemistry
Poster #18

Ethan Walker '22
Chemistry
Poster #8

Wesley Witsken '22
Communication Studies
Poster #26

Jessica Wright '23
Biology
Poster #5

ABSTRACTS

1. Effect Of Tau Fibril Length On Neuronal Activity

Our research goal is to investigate questions surrounding how tau affects neuronal activities by observing tau fibrils with different lengths. We extracted immature neurons from the corpus callosum of P1 mice, and then cultured the neuronal cells in a neurobasal growth medium inside. We collected data that analyzed the neuronal bursts per electrode. Instead of calculating the total bursts per electrode, we mapped out a trend for each of the solutions of bursts per electrode per day. We then more accurately understood if any of the different variables affected our dependent variable significantly. Another aspect of our analysis was getting rid of outliers, which arose from malfunctioning electrodes. We removed them from the data set when we compared error bars on our histogram data. This method ultimately helped us understand our data with more accuracy. Whether the length of tau fibrils alters the functions of neurons is still under investigation.

Blythe Armstrong '23

Melanie Salvador '23

Biology

Dr. Yi-Fan Lu

2. Defining Westmont Christian College's Dating Rules As An Enthusiastic And Indecisive Female

This study sifts through the narratives of heartbreak, triumph, confusion, and unashamed "wow"s belonging to the niche population of upperclassmen students at Westmont College to join in on the sociological discussion of dating rules, gendered interaction, and deviance from social norm. Drawing on qualitative interviews with students ranging from socially conservative to socially progressive, the findings suggest small campus size increases social judgment and inhibits confidence in action. Both male and female students confirm dating at Westmont College is inherently social and, when asked, wish that male students take more initiative and female students never hesitate to give an initial "yes." There is a communicative disconnect between male and female students at Westmont College, and this study seeks not only to illuminate the discrepancy between desire and action but also provide guidance for hopeful daters moving forward. Westmont students, your time is now. Welcome.

Chloe Howard '22

Sociology

Dr. Felicia Song

3. Do Physiological, Cognitive, and Behavioral Factors Influence Social Distancing Attitudes?

This study took 25 Westmont students and examined whether risk-decision making, working memory capacity, cognitive framing, and cognitive reflection are involved in COVID-19 decision making. Furthermore, we examined whether cardiac vagal tone, which is a physiological proxy of emotional regulation, modulates these cognitive factors. We hypothesized that people who make riskier decisions have lower cognitive processes, lower emotional regulation, and engage in less social distancing. However, our results showed that participants who engage in less social distancing actually have greater emotional regulation. This finding has implications for societal assumptions about social distancing behavior.

Allison Nobles '22

Psychology

Dr. Gewnhi Park

4. From James Bond To The Hangover: Depictions of Consent in Male-Centered Movies

This paper examines how consensual sexual behavior is depicted in media, and how that compares to how we teach consent in public schools. Through a content analysis of 12 movies evenly split between the top-grossing action and comedy movies, the two top genres most watched by a male audience, the expected findings will suggest that consent is usually depicted through implicit verbal and nonverbal communication. Exploring how consent is being depicted to audiences can show us how people are learning what consent is, as Bandura's social learning theory informs us that the media can be a powerful source for learning social behavior, especially sexual behavior.

Madison Henry '22

Sociology

Dr. Felicia Song

5. Multiple Genes in the plrSR Operon Are Required For Bacterial Cell Viability

The plsSR two component regulatory system is required for bordetella bacteria (which cause the human disease whooping cough) to colonize the mammalian respiratory tract. Previously, we showed that while the gene for the sensor kinase plrS could be inactivated, the gene for the response regulator plrR could not, suggesting PlrR is required for general bacterial cell viability. The plrSR genes are co-transcribed with four other genes in an operon of apparent diverse function, including genes encoding a tRNA methyltransferase, an outer membrane protein, and two genes involved in potassium transport. Here, we attempted to make mutations in two of these additional genes, and demonstrate that at least one of them (encoding a potassium transport gene) is also essential for general cell viability. These results suggest that the plrSR operon contains genes that collectively are required for normal cell physiology, in addition to some of the genes' role in virulence

Jessica Wright '22

Anna Terveen '22

Andrea Fernandez Gaitan '23

Biology

Dr. Steve Julio

6. HRV As a Modulator Between Anxiety, Adverse Childhood Experiences, and Attentional Bias

The current study examined whether heart rate variability (HRV), which indicates an individual's ability to self-regulate, modulates the relationship between adverse childhood experiences (ACEs), anxiety, and attentional bias. We measured HRV and participants performed the dot probe task. They were interviewed via the adverse childhood experiences checklist and completed anxiety, worry, and depression measures. Preliminary results indicate HRV modulated the relationship between anxiety and aces; individuals with high ace scores showed higher trait anxiety, which was more pronounced in those with low HRV. Additionally, participants with more aces were found to have greater attentional biases. HRV also modulated the relationship between aces and attentional biases, such that higher levels of attentional bias demonstrated by individuals with aces was more pronounced in those with lower HRVs. These results provide initial evidence that the role of aces in the development of anxiety and negative attentional bias is modulated by HRV.

Emma Boyle '22

Psychology

Dr. Gewnhi Park

7. Caffeine Stress and Mood

The present study examined the correlation between stress and caffeine consumption. We also examined the relationship between caffeine consumption and negative affect mood. The surveys used in this study were perceived stress scale to assess individual stress level, profile of mood states (POMS) to assess negative affect, and a daily caffeine consumption questionnaire. Seventy-three participants completed the online questionnaires via Qualtrics. The results showed that there was a significantly positive correlation between stress and caffeine consumption. The more stressed people were, the more caffeine they consumed. Additionally, there was a significantly positive correlation between caffeine consumption and negative mood. The more caffeine people consumed the more negative affect mood experienced.

Madison Chong '22Psychology
Dr. Gewnhi Park**8. Diabetes: A Serious Problem**

Insulin is a peptide involved in regulating blood glucose levels. While humans only have one type of insulin, mice have two. Previous studies have shown that insulin 2 regulates mouse blood glucose levels similarly to human insulin, but the function of insulin 1 is not well understood. To better understand the structure and function of these peptides, segments of both peptides were synthesized, purified using HPLC, and identified using ESI-MS. The aggregation propensity of both partial and full-length peptides was investigated. Circular dichroism indicated that the partial length peptides formed B-sheet aggregates after one week of incubation while the full-length B chains retained a random coil structure. Images collected using transmission electron microscopy (TEM) indicated that both partial length peptides formed fibrils while the full B chains did not. Future studies will explore the aggregation kinetics of the partial-length peptides using Thioflavin T fluorescence.

Ethan Walker '22Claire Neal '23
Riellie Desoto '24
Chemistry
Dr. Kristi Cantrell**9. Testing For Diversified Physiological Strategies In Western Fence Lizards (Sceloporus Occidentalis) Across An Urban Gradient**

Changes in environmental stressors associated with urbanization can result in both adaptive and maladaptive physiological changes in organisms living in urban environments. Numerous previous studies have tested for differences in immune function and stress physiology between urban and wild populations of birds, but very little research has been conducted on non-avian reptiles. We compared the western fence lizard (*Sceloporus occidentalis*), an abundant species in Santa Barbara, living in urbanized (high surface imperviousness, low canopy cover, high artificial light) and rural (low surface imperviousness, high canopy cover, low artificial light) distributed across the city. Using blood samples taken minutes after capture, we tested for differences in blood glucose, corticosterone, and innate immune function (natural antibodies and complement-mediated lysis) between urban and rural lizards. We discuss how our findings illuminate the physiological strategies employed by lizards that have successfully colonized urban environments.

Noah Hareb '22**Laura Dagg '22****Isabelle Hugoniot '23****Eric Reyes '24**Biology
Dr. Amanda Sparkman

ABSTRACTS

10. Philopatric Behavior and Territorial Aggression in Acorn Woodpeckers Across an Urban-Wild Gradient

In both urban and rural areas of western U.S.A, acorn woodpecker families cooperate to maintain and defend home granaries containing their acorn food supply. As recent work in Santa Barbara showed fewer males in urban families compared to wild families, we hypothesized that to females. We tested for an association between urbanization and higher instances of aggression and decreased male philopatry (presence on the home granary). We observed both intraspecific and interspecific aggressive interactions and identified the sex of woodpeckers in each family group. Contrary to our prior findings, there was no significant difference in sex ratios. Furthermore, there was no difference in frequency of aggressive interactions or philopatric behavior across the urban wild gradient. This suggests that there is no difference in woodpecker behavior with respect to these variables during the pre-breeding season.

Laura Dagg '22
Isabelle Hugoniot '23
Eric Reyes '24
Biology
Dr. Amanda Sparkman

11. Million Ether Webpage - A Modern Approach To The Million Dollar Homepage

The Million Dollar Homepage was a website created in 2005 by Alex New to raise money for his education. Each of the pixels on a 1000 x 1000 grid canvas was sold for \$1 each for users to import an image in their subsection of the canvas and an embedded link to an external website. The Million Ether Webpage is a more modern approach to this website with more modern technologies to keep the website fast, secure, and better maintained. Instead of uploading a photo, the pixels are individually colored to create a more retro style and will also have live updates similar to a collaborative document like Google Docs. Changing the color of each pixel will be no charge, but there will be a cool-down period when a user can change the color of another pixel.

Levi Nelson '22
Computer Science
Dr. Donald Patterson

12. Listening to Laughter: The Art of Listening To Augmentative and Alternative Communication

How can people better listen to those who primarily communicate without embodied speech? In order to begin answering this question, I conducted observational studies of people with disabilities who use non-verbal communication in the Santa Barbara community. I spent a total of 20 hours observing one central participant, and did shorter interviews and observations with three others and their families. Out of this surfaced 5 central themes that have become the chapters of a creative memoir-style work. *Listening to Laughter*, containing both narrative and advocacy, tells stories of the participants, my own stories, and how the audience can learn from them.

Abigail Bradshaw '23
Communication Studies
Dr. Greg Spencer

ABSTRACTS

13. A Heart-To-Heart From Me To You: Perceived Racial Discrimination's Effect On Heart Rate Variability In Asian Americans

It has been shown that overt racial discrimination has a negative impact on heart health over a lifetime. However, less work has been done if perceived racial discrimination where race is not directly mentioned has this same effect. In this experiment, we examine how perceived racial discrimination from an in-group vs out-group member affects heart rate variability, a measure of long term heart health. Asian participants witness an interaction where they are discriminated against by a research assistant (white or Asian) on the basis that they are not 'extroverted' or 'able to social network' adequately to participate in another study. From this, no significant changes in HRV were found between participants in either category. Even so, significant changes in HRV found in other minority groups points toward the need for further study on Asian individuals.

Tiana Krukar '22

Psychology
Dr. Gewnhi Park

14. Predicting the Missing Transverse Momentum Trigger Rate at ATLAS with Machine Learning

One of the challenges of the ATLAS missing transverse momentum trigger is understanding how the trigger rate will evolve with the number of proton collisions per bunch crossing, or pileup. In the past, the data have been fit to parametric functions and extrapolated to higher pileup values. In this poster, we present a new technique using machine learning regression models to describe the trigger rate, and allow for extrapolation to higher values of pileup.

Chandler Baker '24

Physics
Dr. Benjamin Carlson

15. Soul Sight

The following study seeks to reveal the common humanity shared between college students and unhoused individuals by drawing from data collected in interviews with members of each group. In this qualitative research process, 16 in-depth interviews from both college students (who attend a private Christian institution: Westmont College) and unhoused individuals who live in the Santa Barbara area were conducted as to highlight the inherent worth and dignity that each person holds— regardless of differing social status, living situations or economic standing. Accordingly, this study offers insight into the intricacies of these distinct subcultures by navigating differences across social and economic disparities while still calling attention to the truths that everyone craves connection, belonging and a sense of purpose in their life.

Maria Barend '22

Sociology
Dr. Felicia Song

ABSTRACTS

16. Can Construal Theory of Self-Regulation Explain Physiological Stress Reduction?

This study investigates the effect of cognitive construal on physiological responses after a Laboratory stressor. Construal theory of self-regulation proposes that those who engage in high level construal (framing events in a psychologically distant/global way) may be more able to exert more self-control than those who engage in low-level construal (framing events in a psychologically near/specific way). We predicted that participants who engaged in higher-level construal would have greater physiological stress reduction, shown by reduced heart rate (HR) and electrodermal activity (EDA). We randomly assigned participants to either a low-construal or high-construal condition and induced stress by asking them to perform the cold pressor task (CPT). We measured HR and EDA at baseline, during the stressor, and for a recovery period after the stressor.

Keywords: cognitive construal, construal theory, acute stress reduction, heart rate, skin conductance response

Jenna Peterson '22

Psychology
Dr. Gewnhi Park

17. Seatbelt Pretensioner Firing In Forward Learning Individuals: A Pilot Study

A seatbelt pretensioner system is a pyrotechnic device that can explode during a crash and pull 3-4 inches out of slack out of the seatbelt. These systems are standard in vehicles but only rigorously tested and optimized for performance when occupants are sitting in a standard position (despite the fact that passengers often sit in a variety of postures). Therefore, our project attempted to 1) determine the feasibility of using our 3d motion capture to interpret body motion following a pretensioner fire, and 2) evaluate the pretensioner firing in occupants adopting a forward leaning positions. We placed 3d markers on two subjects at various markers on the body (head, shoulders, chest, and legs). We calculated measures of velocity, acceleration and position of the head, trunk, and lower extremities. Despite the high speed of pretensioner firing, using our marker system, we were able to detect kinematics in the human (although markers flew off the seatbelt!). We found that the ability of the pretensioner in bringing an individual back to upright was dependent on the size of the individual. Finally, we found larger motion in the legs than expected.

Kendall Breedan '22

Esther Cabrera '22

Monika Lopez '22

Michael Rodrigues '22

Carlos Sandoval '22

Teagan Matye '22

Kinesiology
Dr. Adam Goodworth

18. Where Is the Biphenyl? Oh, There It Is!

In an ultra-high vacuum chamber, 1,4-dimethylnaphthalene (1,4-DMN) was vapor deposited onto a cryogenically cooled Al_2O_3 . A bilayer was formed with the deposition of a second layer of biphenyl. Then the bilayer was subjected to temperature programmed desorption (TPD) during which the adlayer was illuminated by ultraviolet light which optically pumped the molecular adlayers. The bilayer exhibited a novel spectrum that was quite different from either biphenyl or 1,4-dmn alone, and was attributed to a van der Waals complex that formed as the two layers mixed during TPD. Plots of the fluorescence intensities as a function of the molecular composition of the bilayer showed that the composition of the complex was one molecule of biphenyl to one molecule of the DMN. Bilayers of 1,5-dmn and biphenyl were also deposited on the Al_2O_3 crystal and the results showed that the composition of the complex had 4 times more biphenyl compared to that of the 1,4-DMN/biphenyl complex.

Nicole Bond '23,
Bryan Dionisio '22,
Christian Kim '22,
Asher Littlejohn '23,
Sam Rosenhagen '23,
Cassidy Tran '23,
Lexy Gilette '22
Chemistry
Dr. Allan Nishimura

19. Physiological Modulator Of Sensation Seeking And Risk Taking

The purpose of this experiment was to determine if heart rate variability (HRV) modulates the relationship between the sensation seeking personality trait and risk taking behavior. Undergraduate psychology students participated in the experiment. Participants' resting HRV was first measured, then they completed the balloon analogue risk task, followed by the brief sensation seeking scale. Replicating previous research, there was a significant positive correlation between sensation seeking and risk-taking, however this relationship was not modulated by HRV. This finding may call into question the body of literature supporting the neurovisceral integration model proposed by Thayer & Lane (2000) in which individuals with lower HRV lack inhibitory processes central to emotional regulation, thereby making more risk-taking decisions.

Keywords: sensation seeking, heart rate variability, risk taking, BART

Emily Peterson '22
Psychology
Dr. Steve Rogers

20. Romantic Relationships In The Evangelical Mind: A Fantasy Theme Analysis Of Christian Dating Books

This research examines popular press Christian dating books through the lens of symbolic convergence theory and its primary method, fantasy theme analysis. Analysis of these books reveals four fantasy themes characterizing the evangelical Christian construction of dating and romantic relationships. These themes are marriage as a reward, marriage as sacred, individual impotence, and individual agency. The inconsistency of these themes suggests a complex evangelical rhetorical vision concerning romantic relationships. The influence of purity culture within evangelicalism, along with its significant criticism, is also explored in relation to these fantasy themes.

Loren Schneider '22
Communication Studies
Dr. Elizabeth Gardner
Sociology
Dr. Blake Victor Kent
Dr Felicia Song

ABSTRACTS

21. Framing Floyd: Analyzing Disparities In Issue Framing Around The Death of George Floyd

During May of 2020, George Floyd, a black citizen of Minneapolis, was killed by a local police officer who knelt on his neck until he could no longer breathe. This content analysis examines the language within news articles from one politically liberal news source (the New York Times) as well as one politically conservative source (the New York Post) regarding the killing of George Floyd, with the purpose of analyzing how the instance and its following consequences are framed, specifically focusing on the role of race. Drawing on data from 113 articles, 67 of which are New York times opinion editorial pieces, and the remaining 46 are New York Post opinion editorial pieces, specific words and phrases as well as general themes were coded for, demonstrating predominantly a relational/semantic analysis. The research process is on-going, but results begin to suggest that articles from conservative sources frame George Floyd's passing as a "death" and the nation's reactions as "violent and chaotic riots", while articles from liberal sources frame his passing as a "murder" and "killing", and frame national reactions as "peaceful protests". This study provides implications for how we identify the differences of framing of social issues and the consequences of such framings.

Kaylie Jerdal '22

Sociology

Dr. Felicia Song

22. Effects Of Religious Priming On Physiological Responses Toward Alcohol Cues

The present study examined the effect of religious priming on physiological reactions towards alcohol. We hypothesized that participants would show increased physiological responses (e.g., heart rates and skin conductance responses) toward images of alcohol when primed with religious ideas. Participants were randomly assigned to write about god or their dorm room for 5 minutes and then viewed either images of alcohol advertisements or miscellaneous drink advertisements. While surveys showed that higher levels of reported religiosity were associated with more negative views toward alcohol, there was no significant effect of religious priming on physiological responses toward alcohol cues. The findings suggest that religious priming may change participants' explicit attitude toward alcohol, but not physiological responses.

Michael Kong '22

Psychology

Dr. Gewnhi Park

23. The Relationship Between Heart Rate Variability And Mind Wandering In Association With ADHD

Low heart rate variability (HRV) has been associated with a variety of psychological disorders including ADHD, as well as with independent symptoms of disorders such as emotional dysregulation. This study aims to explore the relationship between HRV and mind-wandering, a common symptom of ADHD and other psychological disorders. Participants' HRV was measured using the polar pro-trainer watch for 10 minutes. Participants then completed a cognitive task to measure instances of mind-wandering as well as two surveys regarding mind-wandering and ADHD symptomatology. It was found that increased instances of mind-wandering were associated with higher levels of ADHD symptomatology and lower HRV. This demonstrates that HRV can serve as a predictor for specific symptoms of ADHD and is associated with mind-wandering both in connection with ADHD and independently.

Elise Hanna '22

Research Assistants

Amelia Larsen '22

Sofia Alvarado '24

Psychology

Dr. Gewnhi Park

ABSTRACTS

24. Novel Metal-Catalyzed C-H Functionalization of Aryl Rings using Oxygen-Based Directing Groups

C-C linkages between aromatic rings provide a common structural motif in many important synthesized pharmaceuticals despite the difficulty and few means of making them. Most current means of obtaining aryl-aryl bonds direct the connection to the ortho and para positions on the ring, leaving the meta position relatively elusive. However, using a copper catalyst, successful meta-arylation has been achieved using oxygen-based directing groups. In a similar fashion, the importance of conjugated carbon bonds branching off of aryl rings warrants the continued utilization of olefination conditions using a variety of directing groups. Recent development of an ortho-directed olefination of aryl carbamates using a rhodium catalyst has been reported, giving precedent to the use of alternative sulfamates. Conditions using this group have been attempted, beginning with the synthesis of the Rh catalyst. Despite lack of very initial success, conditions will be varied until an optimal, working reaction is found.

Braden Chaffin '23,
Chris Glevy '22
Alison Thomas '23
Chemistry
Dr. Amanda Silberstein

25. A Study on The Intersectionality Between LGBTQ+ And Religion

Given that there is frequent discussion about LGBTQ+ people and the Christian church being at odds with one another, this project seeks to understand the intersectionality between how LGBTQ+ people who grew up within a religious setting understand and navigate their own sexual and religious identity given the influence of the church. Drawing upon in-depth interviews with individuals who have prior experience of being involved with the Christian faith about their coming out experiences, their experiences within the church, and their journeys of exploration of their understanding of their sexuality, this project demonstrates how LGBTQ+ individuals struggle to navigate and accept both identities and often feel as if they must pick one over the other, which results in participants having a negative perception or opinion of the identity they do not as closely identify with.

Rianne Chow '22
Sociology
Dr. Felicia Song

26. Pivoting to Pilgrimage Places: the Rhetoric of online Westmont chapel during COVID-19

Westmont College has a long tradition of requiring students to attend chapel. Attendees are specifically encouraged to feel a sense of community through participation. However, with the introduction of social-distancing protocols, producers had to find other ways to sustain engagement. The solution to this problem was adopting chapel online, which necessitated construction of new persuasive strategies for a unique cyber-environment. Through textual analysis of archived chapel footage during the 2020-2021 school year, I argue that Westmont chapel rhetorically re-unites individuals to their institutional identity through the strategic deployment of places digitally, constituting them like pilgrims to return to the places that remind them of what it means to be a Westmont student.

Wesley Witsken '22
Communication Studies
Dr. Elizabeth Gardner



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